



PRONTO

FP7-SSH-2013-2

GA: 613504

Start date of the project: 01/02/2014 - Project duration: 48 months

| | |
|----------------------|--|
| Deliverable N° | 2.1 |
| Deliverable name | Working paper on the protectionist nature of certain tax regulations |
| Work Package | WP2 Improving Comparative Quality of Data |
| Status-Version | Working paper |
| Lead Participant | University of Bern |
| Date (this version): | 02/09/2015 (subject to revision) |
| Date of paper: | July 2015 |
| EC Distribution | Public |

Abstract

Export processing zones (EPZs) can be defined as specific, geographically defined zones or areas that are subject to special administration and that generally offer tax incentives, such as duty-free imports when producing for export, exemption from other regulatory constraints linked to import for the domestic market, sometimes favourable treatment in terms of industrial regulation, and the streamlining of border clearing procedures. We describe a database of WTO Members that employ special economic zones as part of their industrial policy mix. This is based on WTO notification and monitoring through the WTO's trade policy review mechanism (TPRM), supplemented with information from the ILO, World Bank, and primary sources. We also provide some rough analysis of the relationship between use of EPZs and the carbon intensity of exports, and relative levels of investment across countries with and without special zones.

**Special Tax Treatment as Trade Policy:
A Database on Export Processing and Special Economic Zones**

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This version: July 2015

Abstract: Many countries treat income generated via exports favourably, especially when production takes place in special zones known as export processing zones (EPZs). EPZs can be defined as specific, geographically defined zones or areas that are subject to special administration and that generally offer tax incentives, such as duty-free imports when producing for export, exemption from other regulatory constraints linked to import for the domestic market, sometimes favourable treatment in terms of industrial regulation, and the streamlining of border clearing procedures. We describe a database of WTO Members that employ special economic zones as part of their industrial policy mix. This is based on WTO notification and monitoring through the WTO's trade policy review mechanism (TPRM), supplemented with information from the ILO, World Bank, and primary sources. We also provide some rough analysis of the relationship between use of EPZs and the carbon intensity of exports, and relative levels of investment across countries with and without special zones.

Keywords: Free Trade Zones, Special Economic Zones, Tax Policy and Trade, Export Promotion

JEL codes: F14, F13, O24, O25

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This research has benefitted from support under the EC Seventh Framework Program for research, technological development and demonstration under grant agreement no 613504: PRONTO (productivity, non-tariff barriers, and openness).

1. Introduction

EPZs can be defined as specific, geographically defined zones or areas that are subject to special administration and that generally offer tax incentives, such as duty-free imports when producing for export, exemption from other regulatory constraints linked to import for the domestic market, sometimes favourable treatment in terms of industrial regulation, and the streamlining of border clearing procedures. Many countries treat income generated via exports favourably, especially when production takes places in special zones known as export processing zones (EPZs). Indeed the World Bank (2008) estimates that there are over 3500 SEZs in over 135 countries. Their combined economic activity accounts for 65 million jobs and over \$500 billion of trade-related value added. Nevertheless, there is little evidence on the impact of such zones on trade performance, nor on how this impact varies based on underlying conditions.

In this paper, we introduce a database of WTO Members that employ special economic zones as part of their industrial policy mix. This is based on WTO notification and monitoring through the WTO's trade policy review mechanism (TPRM), supplemented with information from the ILO (2007), World Bank (2008), and primary sources. We also provide characterization of the population of countries using such policies, and some rough analysis of the relationship between use of EPZs and the carbon intensity of exports, and relative levels of investment across countries with and without special zones. The database described here also provides a mapping of the use of various economic zone schemes to corporate tax structures, trade tax structures, the quality of legal systems, and various measures of trade and investment performance.

We find that zone-based schemes are primarily used by countries that are both relatively poor on a per-capita income basis, and relatively small in terms of GDP. At first cut, we do not find compelling evidence that free trade zones affect the overall volume or the composition of trade. We do find evidence that zones attract more activity from MNEs, as measured by income to foreign direct investment. Interestingly, we also find a positive and significant relationship between use of special economic zones and the carbon intensity of exports (i.e. the CO₂ embodied in exports). At sector level, there is some shift in the composition of trade from special economic zones (but not from free trade zones), especially with respect to motor vehicles and parts, and also textiles, clothing and footwear. In addition, there is some evidence that special economic

zones encourage local production of processed foods, and so serve as a non-tariff barrier in this sector.

2. Data Sources

The database includes both indicators of use of special zones by WTO Member States, as well as performance indicators that can be used to assess how such policies may map to outcomes like investment, trade composition, and the CO2 intensity of exports.

For the indicators of use of economic zones by WTO Member states, our primary source of data on zones is the most recent set of trade policy review mechanism (TPRM) exports from the World Trade Organization. We have also employed supplementary information (in part for cross checking) from the ILO, the NGO Know Your Country, and the World Bank. We note that the literature uses mixed, overlapping, and sometimes contradictory definitions of special economic zones. We employ the following definition here, and have categorized national regimes based on the primary form taken. First, we define two kinds of free trade zones. The first of these are export processing zone (EPZs), defined as designated areas where firms can import goods duty free for further processing and re-export. In EPZs, firms can also export to the domestic market, but in this case they must also pay import duties on the goods sold domestically. A second set of free trade zones allows for preferential (even duty free) sale to the domestic market from inside designated areas that otherwise function like EPZs. We designate these export and import processing zones, or EMPZs. A final set of zones we list here is special economic zones (SEZs) that, while not focused specifically on production for export, nonetheless provide a mix of preferential tax treatment, lower regulatory burdens, and preferred access to infrastructure services. Such zones are sometimes designed to attract foreign investment, or to encourage domestic investment, in certain regions or sectors. We do not focus on a related set of policies known as free ports. Almost all countries have designated areas immediately around ports that allow for free movement and warehousing before fully clearing customs. These are generally meant to lower transaction costs linked to trade, and are not usually sector specific.

The WTO reports on the existence of EPZs, EMPZs, and SEZs in its TPRM reports, and the WTO Members themselves submit questions to other Member delegations on the working of such regimes. A valid concern is the extent to which such zones may violate WTO rules limiting subsidies and prohibiting

export performance requirements. (See Creskoff and Walkenhorst 2013, and Waters 2013 for further discussion on this point). In the case of SEZs, lower regulatory burdens in pursuit of FDI may mean greater environmental impact from production in such zones. Another basic question is the actual effectiveness of such policies in terms of attracting foreign firms, boosting trade, and shifting the composition of trade.

3. Database Contents Overview

The database itself is supplied as in STATA format. Table A-1 provides a summary of the data contained in the database. The database represents a “rolling cross-section” in the sense that WTO Members are reviewed on a rolling basis, ranging from once to every 2 years to 4 years or even longer. In general though, these regimes have been in place since the early to mid 2000s and sometimes much earlier, though the specific rules and regulations governing the zones do change over time. With the exception of the CO₂ intensity of exports, which is based on Fernandez Amador et al (2015), the data apart from the economic zone indicators come from the World Bank, or are derived from other data contained in the table below (scientific articles per million population, and multi-year averages).

Table A-2 provides summary statistics for the elements of the database. In total, we have data for 125 countries (see Table A-3). For most variables, the sample coverage is complete, though for some indicators, coverage is more limited. For such cases, we have also provided averages over available years, though other multi-year averages for a smaller span can also be generated from the data provided.

4. Analysis of Zones, Total Trade, and Investment

The data provided above provide not only indicators of countries that use economic zones for trade policy, but also a mapping to various indicators of outcomes that may follow from such policies. We provide an initial analysis here to highlight the type of questions raised in the recent literature on economic zones. For example, one reason for use of such policies is to attract foreign investment and production by multinational firms (UNCTAD 2000, Creskoff and

Walkenhorst 2013, Kway 2014). There is also the combined goals of encouraging a better mix and volume of exports, and of helping firms (domestic and foreign) overcome local regulatory burdens (Creskoff and Walkenhorst 2013, Zeng 2015, World Bank 2008).

Figures 1 to 4 provide some characterization of the set of countries that use free trade zones and special economic zones. In Figure 1 we provide a mapping of the per-capita income weighted use of free trade zones (both EPZs and EMPZs) classified by per-capita income. In Figure 2, we provide a mapping of the GDP weighted use of free trade zones (both EPZs and EMPZs) classified by GDP level. It is clear from the figures that free trade zones are primarily used by lower income economies, which are also characterized by relatively low levels of GDP. Figures 3 and 4 provide a similar mapping; again with per-capita income weighted use of special economic zones and GDP weighted use of special economic zones. The pattern that emerges is again one of smaller and lower income countries being more likely to employ such policies.

Figure 1

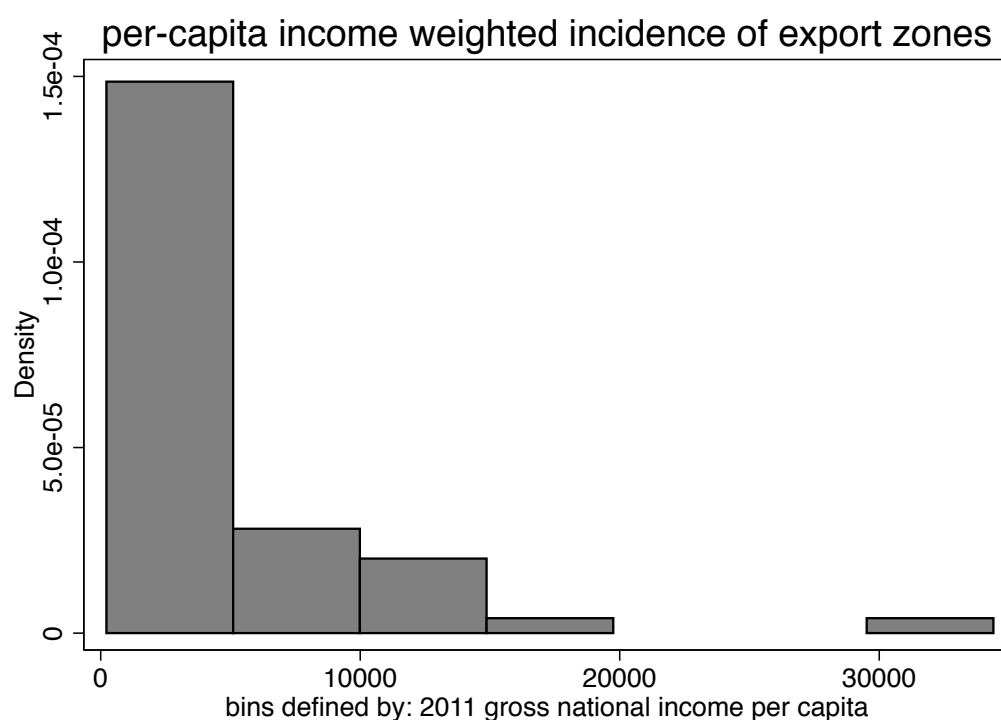


Figure 2



Figure 3

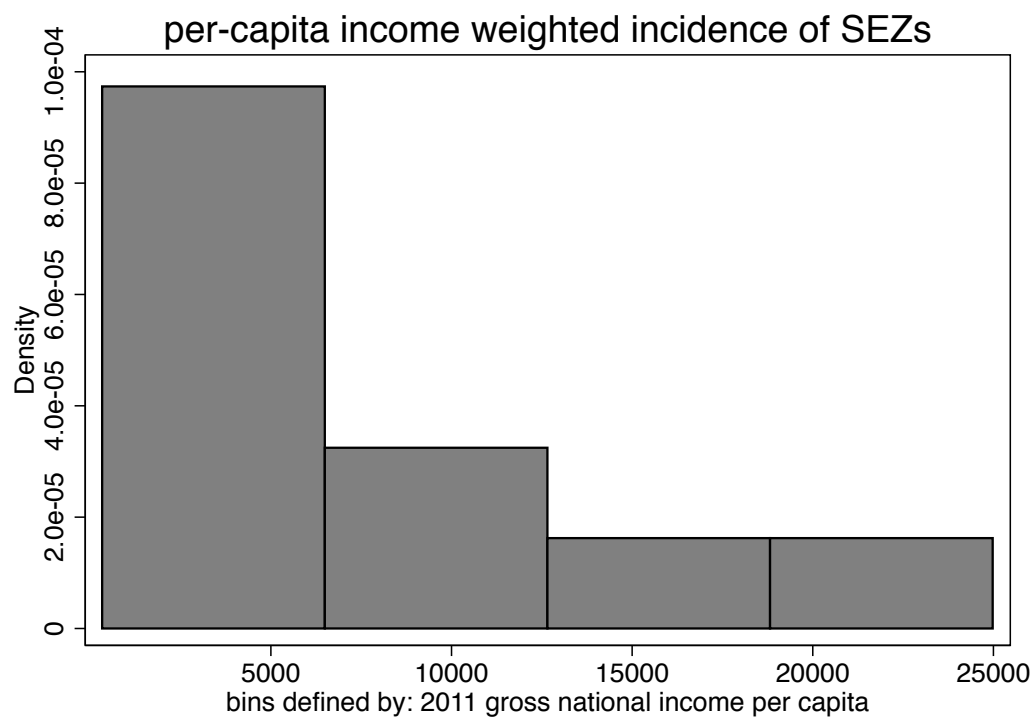
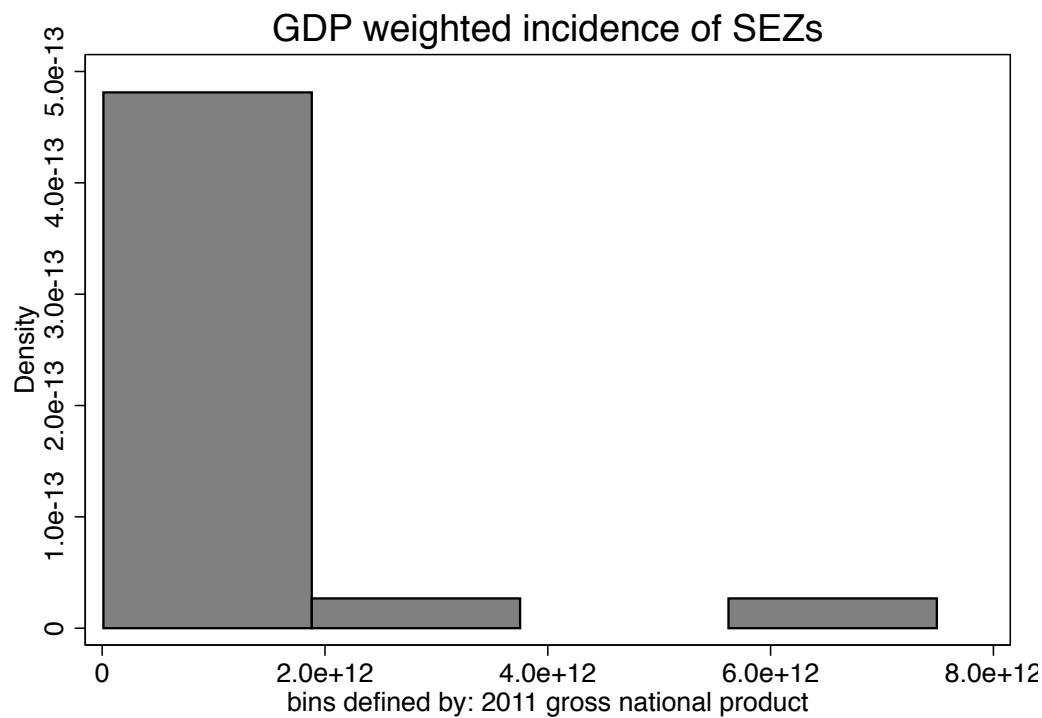


Figure 4



Consider next the extent to which we observe more MNE activity (or not) in countries with either trade or other forms of special economic zones. Table 1 below presents OLS regressions (with t-ratios based on robust standard errors) for a regression of the log of income earned by FDI (taken as an average over the sample period) as a function of taxes on profit, and income level and country size, but also the use of special zones. Not surprisingly, we see more MNE activity, as measured the income to FDI, in countries with higher incomes, in larger countries, and in regimes with lower tax rates. At the same time, we do observe more FDI income in countries with special economic zones, though we do not really see strong effects for countries with free trade zones.

Table 2 reports on OLS results for the composition of exports. The first two columns focus on trade as a percent of GDP, while the second focus on the share of exports in high tech products. Basically, we find that country size (captured by population) and higher tariffs means less trade as a share of GDP (a standard set of results) but also no real correlation between trade shares and special economic zones. Indeed there is a significant negative relationship between free trade zones and trade intensity. This is consistent with the role of free trade zones as a short cut to overcoming regulatory burdens (in other words poor performers are more likely to turn to such solutions). This also suggests benefits

Table 1: FDI income

| | ln(FDI income) | Ln(FDI income) |
|--------------------------------------|--------------------|--------------------|
| ln(population) | 0.876 (14.81)** | 0.786 (11.99)** |
| ln(per capital income) | 1.629 (11.54)** | 1.588 (12.66)** |
| ln(1+profit tax rate) | -1.035§ (1.86) | -0.991 (2.22)* |
| Free trade zone (EPZ and/or EMPZ) | | 0.440 (1.61) |
| Special economic zone | | 0.634 (2.47)* |
| constant | -6.497 (3.82)** | -5.134 (3.29)** |
| R^2 | 0.84 | 0.86 |
| N | 70 | 70 |

* $p < 0.05$; ** $p < 0.01$, § $p < .15$, based on robust standard errors

Table 2: Export Indicators

| | Trade percent of GDP | Trade percent of GDP | High tech percent of exports | High tech percent of exports |
|--------------------------------------|----------------------------|----------------------------|------------------------------------|------------------------------------|
| ln(population) | -19.550 (5.33)** | -18.930 (5.01)** | 0.890 (1.38) | 0.721 (1.05) |
| ln(per capita income) | 0.464 (0.09) | -0.810 (0.14) | 1.628 (1.97) | 1.610 (1.64) |
| ln(1+MFN tariff) | -4.810 (3.12)** | -4.394 (2.78)** | | |
| port quality | 9.133 (0.92) | 8.553 (0.86) | 1.543 (0.93) | 1.457 (0.89) |
| Free trade zone (EPZ and/or EMPZ) | | -15.495 (2.12)* | | -0.716 (0.33) |
| Special economic zone | | 0.935 (0.08) | | 3.328 (0.95) |
| constant | 390.084 (6.68)** | 398.579 (6.57)** | -25.115 (2.33)* | -22.005 (1.99)* |
| R^2 | 0.42 | 0.43 | 0.12 | 0.14 |
| N | 75 | 75 | 107 | 107 |

* $p < 0.05$; ** $p < 0.01$, § $p < .15$, based on robust standard errors

from research on the relationship between institutional quality and use of free trade zones. The last two sets of columns focus on the technology intensity of exports and free trade zones. Here we find no real relationship at all. There is no real evidence that countries using free trade zones are better at exporting high tech products.

Finally, Table 3 reports results on the CO2 intensity of exports. Here, we use data based on Fernandez-Amador, who provide estimates of the CO2 embodied in exports for 2011. This reflects both direct and indirect embodied CO2 (involving intermediate linkages). What we find is that free trade zones do not themselves appear to have an impact on the carbon intensity of production for export. There is a clear Kuznets-curve at work (meaning a non-linear relationship between income levels and CO2 intensity). However, this is unaffected by use of free trade zones. At the same time, there is a clear, strong relationship between other types of special economic zones and the CO2 intensity of exports. Recall from our introduction that while not focused specifically on production for export, such zones nonetheless provide a mix of preferential tax treatment, lower regulatory burdens, and preferred access to infrastructure services. To the extent this also includes easier access to energy, and possible less strict rules governing CO2 intensive activities, this result suggest that the type of industry attracted to these zones seems to be associated with greater CO2 intensity in production for export.

Table 3: CO2 intensity of exports

| | ln(CO2 in exports, MT) | ln(CO2 in exports, MT) |
|--------------------------------------|---------------------------|---------------------------|
| ln(GNI per capita) | 4.344 (5.19)** | 3.968 (4.49)** |
| [ln(GNI per capita)] ² | -0.188 (3.78)** | -0.165 (3.11)** |
| ln(population) | 0.744 (8.03)** | 0.716 (7.62)** |
| Free trade zone (EPZ and/or EMPZ) | | 0.010 (0.04) |
| Special economic | | 0.485 (2.04)* |
| Constant | -25.394 (7.58)** | -23.481 (6.71)** |
| R ² | 0.78 | 0.79 |
| N | 109 | 109 |

* $p < 0.05$; ** $p < 0.01$

5. Gravity Analysis of Zones and Bilateral Trade

In this section we examine the relationship of bilateral exports to the use of export zones and special economic zones. To do this, we work with a gravity model of trade. The basic formulation of the gravity model follows from a range of theoretical models of trade, including Armington-based trade, monopolistic competition, and Eaton-Kortum type models (Anderson and Vanwincoop 2003, Head and Meyer 2014). It specifies bilateral trade flows as a function of importer characteristics, exporter characteristics, and pairwise variables that determine pairwise variation in trade costs. Such determinants of trade costs can be geographic, political, or institutional.

As observable variables in our regressions, we include the standard gravity variables: distance, common colony, common language, common border (contiguous), former colony and dummies for shallow, medium and deep free trade agreements (FTA).¹ Preferential trade agreements are free trade agreements and customs unions that have been agreed at least four years previously (Dür et al., 2014). Besides these traditional gravity regressors, we include two political economy variables, PE index 1 and PE index 2, measuring the pairwise similarity of the two trading partners. These variables reflect evidence that homophily is important in explaining direct economic and political linkages (De Benedictis and Tajoli, 2011). The two political economy variables are calculated as the two first principal components of the following four variables: the difference in polity, the functioning of governance difference, the corruption score difference, and the difference in civil society scores.

Following the theoretical gravity equation, tariffs and the international transport margin have the same coefficient and are thus included as one combined variable called Trade Cost in Table 4 below. Our data on tariffs and transport costs are taken from Bekkers et al (2015). Because importer fixed effects pick up most favoured nation (MFN) tariff rates, for variation in tariff we employ the log

¹ Following Egger et al. (2011), we instrument preferential trade agreements. As explanatory variables in the first stage regression we include the variables also present in the gravity equation (except for tariffs) as well as lagged trade network embeddedness (Easley and Kleinberg, 2010; De Benedictis and Tajoli, 2011; Zhou, 2011) and a variable for the economic mass of the two trading partners together, measured as GDP of the source country times GDP of the destination country.

Table 4: Gravity regressions

| | TOT | B_T | CRP | ELE |
|--------------------------|----------------------|----------------------|----------------------|----------------------|
| trade costs | -4.493 (4.51)*** | -1.956 (3.56)*** | -5.848 (5.40)*** | -14.114 (5.29)*** |
| $\ln(\text{distance})$ | -0.227 (11.61)*** | -0.651 (29.23)*** | -0.419 (21.07)*** | -0.394 (17.41)*** |
| PE index 1 | 0.146 (6.48)*** | -0.224 (5.00)*** | 0.009 (0.30) | 0.248 (6.39)*** |
| PE index 2 | -0.081 (3.09)*** | 0.056 (0.90) | -0.178 (5.30)*** | -0.079 (1.57) |
| common colony | 0.611 (3.90)*** | 0.167 (0.74) | -0.041 (0.26) | 0.714 (2.23)** |
| common ethnic language | 0.249 (2.97)*** | 0.418 (3.52)*** | 0.296 (2.63)*** | 0.517 (3.62)*** |
| common border | 0.793 (10.06)*** | 0.228 (1.80)* | 0.536 (6.47)*** | 0.455 (3.64)*** |
| former colony | 0.372 (3.80)*** | 0.686 (4.29)*** | 0.274 (1.79)* | 0.130 (0.79) |
| shallow FTA (DESTA=1,2) | 0.782 (3.59)*** | -0.909 (1.97)** | 0.509 (2.03)** | -0.134 (0.44) |
| medium FTA (DESTA=3,4,5) | 0.359 (1.98)** | -0.067 (0.29) | 0.115 (0.58) | -0.497 (1.65)* |
| deep FTA (DESTA=6,7) | 1.723 (8.31)*** | 1.581 (4.05)*** | 1.247 (5.86)*** | 1.179 (3.24)*** |
| European Union | 1.241 (10.40)*** | 0.474 (2.62)*** | 0.612 (4.78)*** | 0.685 (3.70)*** |
| importer FTZ | 0.051 (0.32) | 0.345 (1.11) | 0.146 (0.84) | -0.331 (1.33) |
| exporter FTZ | -0.096 (0.62) | 0.008 (0.03) | 0.085 (0.48) | 0.219 (0.79) |
| importer SEZ | 0.038 (0.26) | -0.304 (1.30) | -0.268 (1.52) | -0.423 (1.40) |
| exporter SEZ | 0.279 (1.80)* | -0.202 (0.94) | -0.116 (0.57) | -0.056 (0.19) |
| N | 9,783 | 9,783 | 9,783 | 9,783 |
| pseudo R2 | 0.9370 | 0.9880 | 0.9774 | 0.9638 |

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

PPML estimates, all including source and destination fixed effects.

TOT total goods trade; B_T beverages & tobacco; CRP chemicals, rubber, plastics, ELE electrical machinery; MTL metals; MVH motor vehicles; ; OMC other machinery; PRA primary agriculture; forestry, fisheries; PRE primary energy; PRF processed foods; P C petrochemicals; TCF textiles, clothing, footwear, other light manufactured goods.

PE index 1 and PE index 2 are composite variables of similarity in political economy indicators as discussed in text.

Table 4 continued : Gravity regressions

| | MTL | MVH | OMC | PRA |
|--------------------------|----------------------|----------------------|----------------------|----------------------|
| trade costs | -7.721 (5.75)*** | -3.232 (2.98)*** | -13.594 (6.91)*** | -3.543 (3.15)*** |
| <i>ln</i> (distance) | -0.493 (25.67)*** | -0.469 (18.59)*** | -0.350 (17.99)*** | -0.713 (30.63)*** |
| PE index 1 | 0.055 (2.49)** | -0.021 (0.46) | 0.109 (3.33)*** | 0.152 (4.50)*** |
| PE index 2 | 0.091 (1.53) | -0.092 (1.92)* | -0.141 (3.87)*** | 0.038 (0.64) |
| common colony | 0.106 (0.36) | -0.806 (2.21)** | -0.031 (0.14) | -0.234 (1.25) |
| common ethnic language | 0.316 (2.95)*** | 0.153 (1.07) | 0.372 (3.69)*** | 0.517 (4.59)*** |
| common border | 0.809 (9.91)*** | 0.521 (4.36)*** | 0.579 (5.98)*** | 0.663 (4.55)*** |
| former colony | 0.445 (3.00)*** | -0.341 (1.71)* | 0.296 (2.34)** | 0.137 (1.08) |
| shallow FTA (DESTA=1,2) | 0.142 (0.46) | 0.167 (0.39) | 1.092 (4.31)*** | -0.738 (1.87)* |
| medium FTA (DESTA=3,4,5) | -0.256 (1.05) | 0.566 (2.41)** | -0.298 (1.74)* | -0.150 (0.74) |
| deep FTA (DESTA=6,7) | 0.694 (2.36)** | 1.772 (5.11)*** | 1.459 (4.27)*** | 2.144 (6.16)*** |
| European Union | 0.159 (1.25) | 1.002 (6.73)*** | -0.092 (0.75) | 1.047 (6.24)*** |
| importer FTZ | -0.049 (0.23) | -0.211 (0.73) | -0.069 (0.33) | -0.448 (1.66)* |
| exporter FTZ | -0.090 (0.41) | -0.476 (1.58) | 0.049 (0.20) | 0.041 (0.16) |
| importer SEZ | -0.161 (0.62) | 0.978 (4.36)*** | 0.049 (0.23) | 0.679 (2.75)*** |
| exporter SEZ | 0.104 (0.50) | 0.785 (2.60)*** | 0.284 (1.22) | -0.485 (2.38)** |
| <i>N</i> | 9,783 | 9,783 | 9,783 | 9,783 |
| pseudo R2 | 0.9797 | 0.9779 | 0.9774 | 0.9865 |

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

PPML estimates, all including source and destination fixed effects.

TOT total goods trade; B_T beverages & tobacco; CRP chemicals, rubber, plastics, ELE electrical machinery; MTL metals; MVH motor vehicles; ; OMC other machinery; PRA primary agriculture; forestry, fisheries; PRE primary energy; PRF processed foods; P C petrochemicals; TCF textiles, clothing, footwear, other light manufactured goods.

PE index 1 and PE index 2 are composite variables of similarity in political economy indicators as discussed in text.

Table 4 continued : Gravity regressions

| | PRF | PRE | P_C | TCF |
|--------------------------|----------------------|----------------------|----------------------|----------------------|
| trade costs | -6.266 (9.59)*** | -3.180 (3.38)*** | -12.186 (4.10)*** | -5.060 (5.33)*** |
| <i>ln</i> (distance) | -0.600 (34.99)*** | -0.610 (23.25)*** | -0.548 (10.47)*** | -0.590 (24.62)*** |
| PE index 1 | 0.045 (1.66)* | 0.212 (6.66)*** | 0.038 (1.20) | 0.174 (5.88)*** |
| PE index 2 | -0.043 (1.24) | -0.022 (0.31) | 0.126 (1.99)** | -0.032 (0.91) |
| common colony | -0.189 (0.74) | 0.317 (1.07) | 0.196 (0.76) | 0.281 (0.79) |
| common ethnic language | 0.418 (5.12)*** | 0.491 (2.59)*** | 0.382 (2.41)** | 0.256 (2.27)** |
| common border | 0.782 (10.14)*** | 1.019 (4.21)*** | 1.005 (4.21)*** | 0.898 (9.77)*** |
| former colony | 0.074 (0.73) | 0.752 (3.35)*** | 0.332 (1.78)* | 0.240 (2.04)** |
| shallow FTA (DESTA=1,2) | 0.629 (2.32)** | -1.453 (2.36)** | 0.916 (1.58) | 0.508 (1.44) |
| medium FTA (DESTA=3,4,5) | -0.331 (2.49)** | 0.361 (0.93) | 1.679 (3.57)*** | -0.361 (2.27)** |
| deep FTA (DESTA=6,7) | 1.249 (5.92)*** | 1.712 (4.24)*** | 4.035 (9.86)*** | 1.122 (3.71)*** |
| European Union | 0.469 (3.90)*** | 0.641 (1.96)* | -0.985 (1.44) | 0.331 (2.80)*** |
| importer FTZ | -0.052 (0.29) | 0.607 (2.23)** | -0.179 (0.44) | 0.305 (1.28) |
| exporter FTZ | 0.155 (1.07) | -0.255 (0.91) | 0.196 (0.70) | -0.110 (0.55) |
| importer SEZ | -0.364 (1.89)* | -0.651 (2.33)** | 0.246 (0.68) | -0.197 (0.91) |
| exporter SEZ | -0.049 (0.26) | -0.753 (2.58)*** | -0.445 (1.44) | 0.375 (2.11)** |
| <i>N</i> | 9,783 | 9,783 | 8,150 | 9,783 |
| pseudo R2 | 0.9887 | 0.9456 | 0.8621 | 0.9856 |

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

PPML estimates, all including source and destination fixed effects.

TOT total goods trade; B_T beverages & tobacco; CRP chemicals, rubber, plastics, ELE electrical machinery; MTL metals; MVH motor vehicles; ; OMC other machinery; PRA primary agriculture; forestry, fisheries; PRE primary energy; PRF processed foods; P_C petrochemicals; TCF textiles, clothing, footwear, other light manufactured goods.

PE index 1 and PE index 2 are composite variables of similarity in political economy indicators as discussed in text.

difference between the MFN tariff rate and the preferential tariff rate due to FTAs.

Trade data includes trade with self, or domestic absorption, and our combination of international and domestic trade data comes from the COMTRADE and GTAP databases, and is for the year 2011. Data for tariffs come from the World Bank/UNCTAD WITS database. Distance data are based on the physical length of shipping routes (see Bekkers et al 2015). Other socio-economic data are from Dür et al. (2014), the CEPII database (Mayer and Zignago, 2011), and the Quality of Governance (QoG) expert survey dataset (Teorell et al., 2011).

We estimate a gravity model of trade using a sample of 110 countries in 2011, crossed against our data on economic zones. This yields 9,783 country pairs where we have not only trade and zone data but also the other pairwise variables discussed above and listed in Table 4. Following Santos Silva and Tenreyro (2006, 2011), we employ a Poisson pseudo-maximum likelihood (PPML) estimator for trade for each manufacturing sector listed in Table 4.

The standard gravity equation coefficients in Table 4 all have the expected sign and relative magnitude (based on recent literature). Tariffs reduce trade, with an overall tariff elasticity of around -4.5, with a range at sector level from -2.0 to -14.1. As we have separated shipping costs from other aspects of distance, our distance elasticity is on the low end of current estimates, but still negative and generally highly significant. Free trade agreements have varied effects, depending on the level of ambition represented by the agreement. Relatively deep agreements generate more trade than shallow FTAs. In addition, intra-EU trade is substantially higher than trade between third countries.

For our purpose, what is important is the last four variables in the table. Because we have exporter and importer fixed effects, our basic economic zone indicators are subsumed by these fixed effect terms. Instead, what we have included here is an interaction between economic zones and a pairwise indicator for dyads that are not part of a free trade agreement or customs union. In other words, these four variables reflect dyads where either the exporter or importer has a form of economic zone, but trade is otherwise governed by non-preferential rules. The FTZ term includes both EPZs and EMPZs, and the SEZ term is then for special economic zones. From Table 4, when we look at total trade, there is weak evidence of more trade when the exporter has an SEZ, but there is no sign of additional aggregate trade from free trade zones. Turning to sector results, we

do see additional trade for certain sectors. In manufacturing, use of SEZs by both exporter and importers leads to more trade in motor vehicles and parts. In addition, SEZs in exporting countries have a significant positive relationship with exports of light manufactures (textiles, clothing, and footwear). For food products (primary agriculture and processed foods) results are mixed, with more imports of primary food and less of processed foods where we have SEZs in the importing country. For primary energy, we have more significantly more imports where we also have free trade zones.

Overall, there is no real sign of changes in overall export performance with free trade zones, though we do have evidence in a shift in the composition of trade, with motor vehicle and textile and clothing trade benefiting from SEZs. This suggests that overall export effects from SEZs in the total trade (first column in the table) are driven by textiles and clothing, and by motor vehicles and motor vehicle parts. There is also effective diversion of trade away from imported processed food and toward domestic processed food, along with a parallel increase in primary food (with lower value added) trade.

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Table A-1 Summary Description of Variables in the Database

| variable name | description |
|---------------|--|
| iso3 | 3 digit alphanumeric ISO code for each country |
| name | country name |
| apptmfg09 | applied tariff or manufacturing trade weighted, 2009 |
| apptmfg10 | applied tariff or manufacturing trade weighted, 2010 |
| apptmfg11 | applied tariff or manufacturing trade weighted, 2011 |
| apptmfg12 | applied tariff or manufacturing trade weighted, 2012 |
| apptmfg13 | applied tariff or manufacturing trade weighted, 2013 |
| apptmfg091 | applied tariff or manufacturing trade weighted, 2009-13 |
| bribesf10 | percent of firms reporting bribes, 2010 |
| bribesf11 | percent of firms reporting bribes, 2011 |
| bribesf12 | percent of firms reporting bribes, 2012 |
| bribesf13 | percent of firms reporting bribes, 2013 |
| bribesf14 | percent of firms reporting bribes, 2014 |
| bribesf1014 | percent of firms reporting bribes, 2010-14 |
| cburden10 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2010 |
| cburden11 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2011 |
| cburden12 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2012 |
| cburden13 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2013 |
| cburden14 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2014 |
| cburden1014 | Burden of customs procedure, WEF (1=extremely inefficient to 7=extremely efficient), 2010-14 |
| ccostm2010 | Cost to import (US\$ per 20 foot container), 2010 |
| ccostm2011 | Cost to import (US\$ per 20 foot container), 2011 |
| ccostm2012 | Cost to import (US\$ per 20 foot container), 2012 |
| ccostm2013 | Cost to import (US\$ per 20 foot container), 2013 |
| ccostm2014 | Cost to import (US\$ per 20 foot container), 2014 |
| ccostm1014 | Cost to import (US\$ per 20 foot container), 2010-14 |
| ccostx2010 | Cost to export (US\$ per 20 foot container), 2010 |
| ccostx2011 | Cost to export (US\$ per 20 foot container), 2011 |
| ccostx2012 | Cost to export (US\$ per 20 foot container), 2012 |
| ccostx2013 | Cost to export (US\$ per 20 foot container), 2013 |
| ccostx2014 | Cost to export (US\$ per 20 foot container), 2014 |
| ccostx1014 | Cost to export (US\$ per 20 foot container), 2010-14 |
| co2kt07 | CO2 emissions total in kt, 2007 |

Table A-1 **Summary Description of Variables in the Database**

| variable name | description |
|---------------|---|
| co2kt08 | CO2 emissions total in kt, 2008 |
| co2kt09 | CO2 emissions total in kt, 2009 |
| co2kt10 | CO2 emissions total in kt, 2010 |
| co2kt11 | CO2 emissions total in kt, 2011 |
| co2kt0711 | CO2 emissions total in kt, 2007-11 |
| co2exp11 | CO2 emissions contained in exports MT, 2011 |
| co2pcap07 | CO2 emissions per capita in kt, 2007 |
| co2pcap08 | CO2 emissions per capita in kt, 2008 |
| co2pcap09 | CO2 emissions per capita in kt, 2009 |
| co2pcap10 | CO2 emissions per capita in kt, 2010 |
| co2pcap11 | CO2 emissions per capita in kt, 2011 |
| co2pcap071 | CO2 emissions per capita in kt, 2007-11 |
| co2pct07 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2007 |
| co2pct08 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2008 |
| co2pct09 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2009 |
| co2pct10 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2010 |
| co2pct11 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2011 |
| co2pct0711 | CO2 emissions intensity (kg per 2011 PPP \$ of GDP), 2007-11 |
| empz | dummy for country with export and import processing zone (from 2011-2015 TPRM report cycle) |
| epz | dummy for a country with export processing zone (from 2011-2015 TPRM report cycle) |
| fdiinc09 | Primary income on FDI, payments (current US\$), 2009 |
| fdiinc10 | Primary income on FDI, payments (current US\$), 2010 |
| fdiinc11 | Primary income on FDI, payments (current US\$), 2011 |
| fdiinc12 | Primary income on FDI, payments (current US\$), 2012 |
| fdiinc13 | Primary income on FDI, payments (current US\$), 2013 |
| fdiinc0913 | Primary income on FDI, payments (current US\$), 2009-2013 |
| fdipct09 | Foreign direct investment, net inflows (% of GDP), 2009 |
| fdipct10 | Foreign direct investment, net inflows (% of GDP), 2010 |
| fdipct11 | Foreign direct investment, net inflows (% of GDP), 2011 |
| fdipct12 | Foreign direct investment, net inflows (% of GDP), 2012 |
| fdipct13 | Foreign direct investment, net inflows (% of GDP), 2013 |
| fdipct14 | Foreign direct investment, net inflows (% of GDP), 2014 |
| fdipct0913 | Foreign direct investment, net inflows (% of GDP), 2009-13 |
| gdpusd10 | GDP (current US\$), 2010 |
| gdpusd11 | GDP (current US\$), 2011 |
| gdpusd12 | GDP (current US\$), 2012 |
| gdpusd13 | GDP (current US\$), 2013 |
| gdpusd14 | GDP (current US\$), 2014 |

Table A-1 **Summary Description of Variables in the Database**

| variable name | description |
|---------------|--|
| gdpusd1014 | GDP (current US\$), 2010-14 |
| gnipc10 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2010 |
| gnipc11 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2011 |
| gnipc12 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2012 |
| gnipc13 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2013 |
| gnipc14 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2014 |
| gnipc1014 | GNI per capita, converted to U.S. dollars using the World Bank Atlas method, 2010-14 |
| htech09 | High-technology exports (% of manufactured exports), 2009 |
| htech10 | High-technology exports (% of manufactured exports), 2010 |
| htech11 | High-technology exports (% of manufactured exports), 2011 |
| htech12 | High-technology exports (% of manufactured exports), 2012 |
| htech13 | High-technology exports (% of manufactured exports), 2013 |
| htech0913 | High-technology exports (% of manufactured exports), 2014 |
| jrnart07 | Scientific and technical journal articles published, 2007 |
| jrnart08 | Scientific and technical journal articles published, 2008 |
| jrnart09 | Scientific and technical journal articles published, 2009 |
| jrnart10 | Scientific and technical journal articles published, 2010 |
| jrnart11 | Scientific and technical journal articles published, 2011 |
| jrnart0711 | Scientific and technical journal articles published, 2007-11 |
| jrnartpm07 | Scientific and technical journal articles published per million population, 2007 |
| jrnartpm08 | Scientific and technical journal articles published per million population, 2008 |
| jrnartpm09 | Scientific and technical journal articles published per million population, 2009 |
| jrnartpm10 | Scientific and technical journal articles published per million population, 2010 |
| jrnartpm11 | Scientific and technical journal articles published per million population, 2011 |
| jrnartpm071 | Scientific and technical journal articles published per million population, 2007-11 |
| leg10 | Strength of legal rights index (0=weak to 12=strong), 2010 |
| leg11 | Strength of legal rights index (0=weak to 12=strong), 2011 |
| leg12 | Strength of legal rights index (0=weak to 12=strong), 2012 |
| leg13 | Strength of legal rights index (0=weak to 12=strong), 2013 |

Table A-1 Summary Description of Variables in the Database

| variable name | description |
|---------------|--|
| leg14 | Strength of legal rights index (0=weak to 12=strong), 2014 |
| leg1014 | Strength of legal rights index (0=weak to 12=strong), 2010-14 |
| mdays10 | Time to import (days), 2010 |
| mdays11 | Time to import (days), 2011 |
| mdays12 | Time to import (days), 2012 |
| mdays13 | Time to import (days), 2013 |
| mdays14 | Time to import (days), 2014 |
| mdays1014 | Time to import (days), 2010-14 |
| mfgpct10 | Manufacturing, value added (% of GDP), 2010 |
| mfgpct11 | Manufacturing, value added (% of GDP), 2011 |
| mfgpct12 | Manufacturing, value added (% of GDP), 2012 |
| mfgpct13 | Manufacturing, value added (% of GDP), 2013 |
| mfgpct14 | Manufacturing, value added (% of GDP), 2014 |
| mfgpct1014 | Manufacturing, value added (% of GDP), 2010-14 |
| mfntmfg09 | MFN tariff on manufactured goods, 2009 |
| mfntmfg10 | MFN tariff on manufactured goods, 2010 |
| mfntmfg11 | MFN tariff on manufactured goods, 2011 |
| mfntmfg12 | MFN tariff on manufactured goods, 2012 |
| mfntmfg13 | MFN tariff on manufactured goods, 2013 |
| mfntmfg091 | MFN tariff on manufactured goods, 2009-13 |
| nrpat09 | Patent applications, nonresidents 2009 |
| nrpat10 | Patent applications, nonresidents 2010 |
| nrpat11 | Patent applications, nonresidents 2011 |
| nrpat12 | Patent applications, nonresidents 2012 |
| nrpat13 | Patent applications, nonresidents 2013 |
| nrpat0913 | Patent applications, nonresidents 2009-13 |
| polpct05 | Percent of population exposed to ambient concentrations of PM2.5 measuring greater than 2.5 microns in diameter that exceed the WHO guideline value, 2005 |
| polpct10 | Percent of population exposed to ambient concentrations of PM2.5 measuring greater than 2.5 microns in diameter that exceed the WHO guideline value, 2010 |
| polpct0510 | Percent of population exposed to ambient concentrations of PM2.5 measuring greater than 2.5 microns in diameter that exceed the WHO guideline value, 2005-10 |
| polsmall05 | Percent of population exposed to ambient concentrations of PM2.5 measuring less than 2.5 microns in diameter that exceed the WHO guideline value, 2005 |
| polsmall10 | Percent of population exposed to ambient concentrations of PM2.5 measuring less than 2.5 microns in diameter that exceed the WHO guideline value, 2010 |

Table A-1 **Summary Description of Variables in the Database**

| variable name | description |
|---------------|---|
| polsmall051 | Percent of population exposed to ambient concentrations of PM2.5 measuring less than 2.5 microns in diameter that exceed the WHO guideline value, 2005-10 |
| pop07 | Population, number of people, 2007 |
| pop08 | Population, number of people, 2008 |
| pop09 | Population, number of people, 2009 |
| pop10 | Population, number of people, 2010 |
| pop11 | Population, number of people, 2011 |
| pop12 | Population, number of people, 2012 |
| pop13 | Population, number of people, 2013 |
| pop14 | Population, number of people, 2014 |
| portq10 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2010 |
| portq11 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2011 |
| portq12 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2012 |
| portq13 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2013 |
| portq14 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2014 |
| portq1014 | Quality of port infrastructure, WEF (1=extremely underdeveloped to 7=well developed and efficient by international standards), 2010-14 |
| ptax10 | Total tax rate (% of commercial profits), 2010 |
| ptax11 | Total tax rate (% of commercial profits), 2011 |
| ptax12 | Total tax rate (% of commercial profits), 2012 |
| ptax13 | Total tax rate (% of commercial profits), 2013 |
| ptax14 | Total tax rate (% of commercial profits), 2014 |
| ptax1014 | Total tax rate (% of commercial profits), 2010-14 |
| rndpct08 | Research and development expenditure (% of GDP), 2008 |
| rndpct09 | Research and development expenditure (% of GDP), 2009 |
| rndpct10 | Research and development expenditure (% of GDP), 2010 |
| rndpct11 | Research and development expenditure (% of GDP), 2011 |
| rndpct12 | Research and development expenditure (% of GDP), 2012 |
| rndpct0812 | Research and development expenditure (% of GDP), 2008-2012 |

Table A-1 Summary Description of Variables in the Database

| variable name | description |
|---------------|--|
| rpat09 | Patent applications, residents 2009 |
| rpat10 | Patent applications, residents 2010 |
| rpat11 | Patent applications, residents 2011 |
| rpat12 | Patent applications, residents 2012 |
| rpat13 | Patent applications, residents 2013 |
| rpat0913 | Patent applications, residents 2009-13 |
| sez | dummy for a country with special industrial zones (except EPZs and EMPZs) (from 2011-2015 TPRM report cycle) |
| trdpctgdp10 | Trade (% of GDP), 2010 |
| trdpctgdp11 | Trade (% of GDP), 2011 |
| trdpctgdp12 | Trade (% of GDP), 2012 |
| trdpctgdp13 | Trade (% of GDP), 2013 |
| trdpctgdp14 | Trade (% of GDP), 2014 |
| trdpctgdp1014 | Trade (% of GDP), 2010-14 |
| xdays10 | Time to export (days), 2010 |
| xdays11 | Time to export (days), 2011 |
| xdays12 | Time to export (days), 2012 |
| xdays13 | Time to export (days), 2013 |
| xdays14 | Time to export (days), 2014 |
| xdays1014 | Time to export (days), 2010-14 |

| Table A-2 Summary Stats | | | | | |
|------------------------------|--------------|----------|--------------------|----------|----------|
| variable name | Observations | mean | standard deviation | minimum | maximum |
| apptmfg09 | 109 | 5.607431 | 4.595057 | 0 | 21.82 |
| apptmfg0913 | 119 | 5.352856 | 4.276585 | 0 | 21.82 |
| apptmfg10 | 90 | 4.874889 | 3.656506 | 0 | 17.02 |
| apptmfg11 | 80 | 5.00025 | 4.324482 | 0 | 19.96 |
| apptmfg12 | 83 | 4.677831 | 4.156878 | 0 | 20.08 |
| apptmfg13 | 85 | 4.295765 | 3.720574 | 0 | 16.54 |
| bribesf10 | 22 | 15 | 14.94205 | 1.3 | 57.2 |
| bribesf1014 | 65 | 16.93923 | 15.7537 | 0 | 69.4 |
| bribesf11 | 3 | 11.03333 | 4.735329 | 6.9 | 16.2 |
| bribesf12 | 2 | 12.9 | 1.838477 | 11.6 | 14.2 |
| bribesf13 | 33 | 19.54545 | 18.98414 | 0 | 69.4 |
| bribesf14 | 6 | 20.66667 | 11.65807 | 1.9 | 30.3 |
| cburden10 | 112 | 4.274054 | 0.8351157 | 2.195435 | 6.469531 |
| cburden1014 | 117 | 4.158759 | 0.8443867 | 2.019087 | 6.200627 |
| cburden11 | 115 | 4.193657 | 0.8384854 | 2.3 | 6.2 |
| cburden12 | 114 | 4.162332 | 0.8500485 | 2.1 | 6.2 |
| cburden13 | 116 | 4.136298 | 0.8810744 | 1.8 | 6.2 |
| cburden14 | 113 | 4.137365 | 0.9042364 | 1.7 | 6.1 |
| ccostm1014 | 125 | 1556.614 | 1054.094 | 439.4 | 6402 |
| ccostm2010 | 124 | 1486.295 | 969.8366 | 439 | 6115 |
| ccostm2011 | 125 | 1508.881 | 985.598 | 435 | 6115 |
| ccostm2012 | 125 | 1549.039 | 1045.009 | 420 | 6360 |
| ccostm2013 | 125 | 1607.49 | 1123.972 | 440 | 6360 |
| ccostm2014 | 125 | 1635.538 | 1187.634 | 440 | 7060 |
| ccostx1014 | 125 | 1320.54 | 763.0666 | 457.6 | 4567.4 |
| ccostx2010 | 124 | 1265.229 | 695.2325 | 450 | 4364 |
| ccostx2011 | 125 | 1284.913 | 710.0433 | 450 | 4378 |
| ccostx2012 | 125 | 1313.545 | 756.1753 | 435 | 4465 |
| ccostx2013 | 125 | 1359.321 | 817.8339 | 450 | 4475 |
| ccostx2014 | 125 | 1383.013 | 867.6265 | 460 | 5165 |
| co2exp11 | 110 | 160945 | 387339.9 | 239.0757 | 3080361 |
| co2kt07 | 125 | 305468.8 | 1227546 | 187.017 | 1.04E+07 |
| co2kt0711 | 125 | 322362.5 | 1333959 | 194.351 | 1.15E+07 |
| co2kt08 | 125 | 311202.9 | 1253299 | 190.684 | 1.07E+07 |
| co2kt09 | 125 | 315418.6 | 1311400 | 190.684 | 1.13E+07 |
| co2kt10 | 125 | 331802.8 | 1391650 | 194.351 | 1.20E+07 |
| co2kt11 | 125 | 347919.4 | 1492580 | 209.019 | 1.30E+07 |

Table A-2 **Summary
Stats**

| variable name | Obser- vations | mean | standard deviation | minimum | maximum |
|---------------|-------------------|-----------|-----------------------|-----------|-----------|
| co2pcap07 | 125 | 5.436339 | 7.481315 | 0.0224556 | 56.60904 |
| co2pcap0711 | 125 | 5.233886 | 6.858508 | 0.0217772 | 47.76151 |
| co2pcap08 | 125 | 5.352871 | 7.105728 | 0.0221101 | 49.66898 |
| co2pcap09 | 125 | 5.038894 | 6.584101 | 0.0213611 | 45.61237 |
| co2pcap10 | 125 | 5.166408 | 6.621039 | 0.0210502 | 43.02411 |
| co2pcap11 | 125 | 5.17492 | 6.620358 | 0.0219089 | 43.89304 |
| co2pct07 | 124 | 0.2519761 | 0.1480553 | 0.0315043 | 0.8112582 |
| co2pct0711 | 124 | 0.2455131 | 0.1420483 | 0.0301233 | 0.7868402 |
| co2pct08 | 124 | 0.2452761 | 0.1409907 | 0.0305784 | 0.7752108 |
| co2pct09 | 124 | 0.2428208 | 0.14017 | 0.0295534 | 0.8019502 |
| co2pct10 | 124 | 0.2450565 | 0.1434212 | 0.0290229 | 0.8462445 |
| co2pct11 | 124 | 0.2424359 | 0.1452744 | 0.0299576 | 0.777914 |
| empz | 125 | 0.088 | 0.2844349 | 0 | 1 |
| epz | 125 | 0.408 | 0.4934408 | 0 | 1 |
| fdiinc09 | 78 | 3.69E+09 | 1.25E+10 | 0 | 1.06E+11 |
| fdiinc0913 | 78 | 5.05E+09 | 1.96E+10 | 0 | 1.70E+11 |
| fdiinc10 | 78 | 5.08E+09 | 1.87E+10 | 0 | 1.60E+11 |
| fdiinc11 | 78 | 5.98E+09 | 2.37E+10 | 0 | 2.04E+11 |
| fdiinc12 | 78 | 5.58E+09 | 2.00E+10 | 0 | 1.72E+11 |
| fdiinc13 | 78 | 4.93E+09 | 2.37E+10 | 0 | 2.06E+11 |
| fdipct09 | 125 | 4.194097 | 5.398766 | -3.509585 | 38.51661 |
| fdipct0913 | 125 | 5.45053 | 11.23991 | -3.122206 | 113.3604 |
| fdipct10 | 125 | 7.443029 | 38.57791 | -16.15452 | 430.6151 |
| fdipct11 | 125 | 5.505078 | 7.666047 | -2.904237 | 45.28994 |
| fdipct12 | 125 | 5.137085 | 7.261301 | -6.181242 | 37.73236 |
| fdipct13 | 125 | 4.973364 | 9.045509 | -9.20125 | 61.59165 |
| fdipct14 | 58 | 7.438034 | 29.06069 | -3.767384 | 220.0027 |
| gdpusd10 | 125 | 6.35E+11 | 2.14E+12 | 8.47E+08 | 1.66E+13 |
| gdpusd1014 | 125 | 7.17E+11 | 2.46E+12 | 8.93E+08 | 1.97E+13 |
| gdpusd11 | 125 | 7.08E+11 | 2.38E+12 | 9.04E+08 | 1.92E+13 |
| gdpusd12 | 125 | 7.30E+11 | 2.52E+12 | 9.12E+08 | 2.06E+13 |
| gdpusd13 | 125 | 7.48E+11 | 2.58E+12 | 8.91E+08 | 2.08E+13 |
| gdpusd14 | 115 | 8.23E+11 | 2.78E+12 | 8.07E+08 | 2.14E+13 |
| gnipc10 | 123 | 14374.91 | 18255.82 | 200 | 77360 |
| gnipc1014 | 124 | 15526.99 | 19291.17 | 238 | 82940 |
| gnipc11 | 123 | 14852.69 | 18751.09 | 220 | 79320 |
| gnipc12 | 124 | 15659.67 | 19437.02 | 240 | 84410 |
| gnipc13 | 123 | 16095.12 | 20227.18 | 260 | 90670 |

**Table A-2 Summary
Stats**

| variable name | Observations | mean | standard deviation | minimum | maximum |
|---------------|--------------|----------|--------------------|-----------|----------|
| gnipc14 | 104 | 13782.87 | 18672.78 | 250 | 90420 |
| htech09 | 112 | 10.1868 | 11.69044 | 0 | 65.53303 |
| htech0913 | 117 | 9.883357 | 10.29317 | 0.0815999 | 52.62172 |
| htech10 | 109 | 9.957782 | 11.21924 | 0.058687 | 55.25732 |
| htech11 | 111 | 10.47701 | 10.74853 | 0.0002464 | 47.23403 |
| htech12 | 103 | 10.42868 | 10.51433 | 0.0013268 | 48.85869 |
| htech13 | 101 | 10.66799 | 11.26213 | 0 | 52.44547 |
| jrnart07 | 124 | 7283.919 | 25751.65 | 0 | 209898 |
| jrnart0711 | 124 | 7688.236 | 27188.1 | 1.04 | 210460.6 |
| jrnart08 | 124 | 7571.488 | 26772.11 | 0.5 | 212883 |
| jrnart09 | 124 | 7668.877 | 27112.82 | 1.1 | 208600.8 |
| jrnart10 | 121 | 5992.826 | 20923.96 | 1.3 | 198336.6 |
| jrnart11 | 121 | 6299.541 | 22356.78 | 0.3 | 212428.6 |
| jrnartpm07 | 124 | 167.6446 | 286.3286 | 0 | 1217.78 |
| jrnartpm08 | 124 | 171.7514 | 288.6188 | 0.1201238 | 1220.554 |
| jrnartpm09 | 124 | 169.898 | 284.6538 | 0.2912615 | 1223.193 |
| jrnartpm10 | 121 | 162.4128 | 279.8697 | 0.236368 | 1230.276 |
| jrnartpm11 | 121 | 167.7473 | 285.6816 | 0.2973168 | 1266.19 |
| leg10 | 124 | 5.626728 | 2.479564 | 0 | 10 |
| leg1014 | 125 | 5.480717 | 2.399077 | 0 | 10.8 |
| leg11 | 125 | 5.910286 | 2.344539 | 0 | 10 |
| leg12 | 125 | 5.925793 | 2.351794 | 0 | 10 |
| leg13 | 125 | 4.890483 | 2.656729 | 0 | 12 |
| leg14 | 125 | 5.07531 | 2.838801 | 0 | 12 |
| mdays10 | 124 | 21.99827 | 14.82101 | 4 | 73 |
| mdays1014 | 125 | 21.23955 | 14.48669 | 4 | 75.4 |
| mdays11 | 125 | 21.43286 | 14.52539 | 4 | 73 |
| mdays12 | 125 | 21.18428 | 14.52325 | 4 | 75 |
| mdays13 | 125 | 20.99172 | 14.61588 | 4 | 82 |
| mdays14 | 125 | 20.69462 | 14.38655 | 4 | 82 |
| mfgpct10 | 111 | 14.31472 | 5.875499 | 1.780836 | 35.62372 |
| mfgpct1014 | 111 | 14.21746 | 5.754999 | 1.606814 | 33.81772 |
| mfgpct11 | 109 | 14.35468 | 5.921182 | 1.639543 | 33.99419 |
| mfgpct12 | 108 | 14.13249 | 5.86388 | 1.550553 | 33.97727 |
| mfgpct13 | 105 | 14.02555 | 5.835491 | 1.456324 | 32.94228 |
| mfgpct14 | 78 | 14.46748 | 8.125081 | 2.445844 | 66.25285 |
| mfntmfg09 | 109 | 7.059908 | 4.504663 | 0 | 22.02 |
| mfntmfg0913 | 120 | 6.764753 | 4.173853 | 0 | 22.02 |

**Table A-2 Summary
Stats**

| variable name | Observations | mean | standard deviation | minimum | maximum |
|---------------|--------------|----------|--------------------|-----------|----------|
| mfntmfg10 | 90 | 6.218889 | 3.909898 | 0 | 17.19 |
| mfntmfg11 | 80 | 6.70325 | 4.225582 | 0 | 19.96 |
| mfntmfg12 | 83 | 6.393494 | 4.18106 | 0 | 20.08 |
| mfntmfg13 | 86 | 5.895581 | 3.651491 | 0 | 16.73 |
| nrpat09 | 77 | 11200.66 | 39113.38 | 3 | 239890 |
| nrpat0913 | 98 | 9992.902 | 39433.76 | 1 | 271390.4 |
| nrpat10 | 78 | 11822.53 | 41785.17 | 4 | 256588 |
| nrpat11 | 86 | 11417.79 | 42262.97 | 3 | 276482 |
| nrpat12 | 84 | 12180.71 | 44682.33 | 1 | 282792 |
| nrpat13 | 90 | 11871.49 | 45330.85 | 1 | 301200 |
| olsmall0510 | 124 | 18.39477 | 14.63214 | 4.739997 | 72.60052 |
| polpct05 | 124 | 70.14965 | 38.92181 | 0 | 100 |
| polpct0510 | 124 | 69.25441 | 38.93874 | 0 | 100 |
| polpct10 | 124 | 68.35918 | 39.49466 | 0 | 100 |
| polsmall05 | 124 | 18.44882 | 14.2922 | 4.99448 | 69.93466 |
| polsmall10 | 124 | 18.34072 | 15.05213 | 4.475548 | 79.51939 |
| pop07 | 125 | 6.55E+07 | 2.47E+08 | 286196 | 2.16E+09 |
| pop08 | 125 | 6.62E+07 | 2.49E+08 | 293544 | 2.17E+09 |
| pop09 | 125 | 6.68E+07 | 2.51E+08 | 301016 | 2.19E+09 |
| pop10 | 125 | 6.75E+07 | 2.53E+08 | 308595 | 2.20E+09 |
| pop11 | 125 | 6.81E+07 | 2.55E+08 | 316280 | 2.22E+09 |
| pop12 | 125 | 6.88E+07 | 2.57E+08 | 324060 | 2.23E+09 |
| pop13 | 125 | 6.95E+07 | 2.59E+08 | 331900 | 2.25E+09 |
| pop14 | 125 | 7.02E+07 | 2.61E+08 | 339758 | 2.26E+09 |
| portq10 | 112 | 4.380745 | 1.113921 | 1.396544 | 6.817346 |
| portq11 | 115 | 4.343683 | 1.122244 | 1.5 | 6.8 |
| portq12 | 114 | 4.374149 | 1.093617 | 1.5 | 6.8 |
| portq13 | 116 | 4.336479 | 1.084006 | 1.3 | 6.8 |
| portq14 | 113 | 4.252753 | 1.164242 | 1.3 | 6.8 |
| portq15 | 117 | 4.313822 | 1.097025 | 1.399309 | 6.772957 |
| ptax10 | 124 | 46.62074 | 39.77295 | 9.3 | 339.1 |
| ptax1014 | 125 | 44.26342 | 29.06836 | 11.3 | 239.44 |
| ptax11 | 125 | 45.79137 | 38.1812 | 9.3 | 339.1 |
| ptax12 | 125 | 45.42246 | 37.67333 | 11.3 | 339.1 |
| ptax13 | 125 | 42.59423 | 26.30269 | 11.3 | 275.4 |
| ptax14 | 125 | 40.92908 | 16.9099 | 11.3 | 137.3 |
| rdpctg~1014 | 122 | 95.0637 | 60.89091 | 24.73145 | 444.8954 |
| rnartpm0711 | 123 | 165.8357 | 282.0283 | 0.2377954 | 1231.599 |

**Table A-2 Summary
Stats**

| variable name | Observations | mean | standard deviation | minimum | maximum |
|---------------|--------------|----------|--------------------|----------|----------|
| rndpct08 | 77 | 1.097149 | 1.063528 | 0.02039 | 4.40296 |
| rndpct0812 | 92 | 1.032979 | 1.008352 | 0.052195 | 4.087152 |
| rndpct09 | 72 | 1.146799 | 1.053512 | 0.01748 | 4.16801 |
| rndpct10 | 71 | 1.199587 | 1.022765 | 0.0435 | 3.96501 |
| rndpct11 | 63 | 1.280805 | 1.096521 | 0.0481 | 4.03919 |
| rndpct12 | 35 | 1.726763 | 0.9790616 | 0.17267 | 3.92627 |
| rpat09 | 74 | 23204.84 | 91880.72 | 1 | 667812 |
| rpat0913 | 96 | 22655.04 | 106716 | 1 | 878128 |
| rpat10 | 78 | 23938.55 | 98044.78 | 2 | 731535 |
| rpat11 | 83 | 25587.48 | 111571.1 | 1 | 857546 |
| rpat12 | 81 | 29697.88 | 130825.2 | 3 | 986803 |
| rpat13 | 86 | 32035.88 | 149912.6 | 1 | 1146944 |
| sez | 125 | 0.16 | 0.3680813 | 0 | 1 |
| trdpctgdp10 | 122 | 90.56186 | 58.40269 | 22.51171 | 432.9496 |
| trdpctgdp11 | 122 | 96.14681 | 60.74505 | 23.71042 | 447.0583 |
| trdpctgdp12 | 120 | 96.37971 | 62.21953 | 25.26741 | 449.9926 |
| trdpctgdp13 | 115 | 95.18638 | 64.32619 | 26.3758 | 455.2767 |
| trdpctgdp14 | 96 | 92.56155 | 60.3623 | 25.7919 | 439.1999 |
| xdays10 | 124 | 20.05328 | 11.82556 | 6 | 63 |
| xdays1014 | 125 | 19.32388 | 11.44896 | 6 | 63 |
| xdays11 | 125 | 19.56029 | 11.57889 | 6 | 63 |
| xdays12 | 125 | 19.23945 | 11.53355 | 6 | 63 |
| xdays13 | 125 | 19.0133 | 11.35179 | 6 | 63 |
| xdays14 | 125 | 18.82552 | 11.25126 | 6 | 63 |

Table A-3 Countries in database

| ISO3 | name | ISO3 | name |
|------|------------------------|------|------------------|
| AGO | Angola | KEN | Kenya |
| ALB | Albania | KGZ | Kyrgyzstan |
| ARE | United Arab Emirates | KHM | Cambodia |
| ARG | Argentina | KOR | Korea |
| ARM | Armenia | KWT | Kuwait |
| AUS | Australia | LKA | Sri Lanka |
| AUT | Austria | LTU | Lithuania |
| BDI | Burundi | LUX | Luxembourg |
| BEL | Belgium | LVA | Latvia |
| BEN | Benin | MAR | Morocco |
| BFA | Burkina Faso | MDA | Moldova |
| BGD | Bangladesh | MDG | Madagascar |
| BGR | Bulgaria | MDV | Maldives |
| BHR | Bahrain | MEX | Mexico |
| BLZ | Belize | MLI | Mali |
| BOL | Bolivia | MLT | Malta |
| BRA | Brazil | MNG | Mongolia |
| BRN | Brunei | MOZ | Mozambique |
| CAN | Canada | MRT | Mauritania |
| CHE | Switzerland | MUS | Mauritius |
| CHL | Chile | MWI | Malawi |
| CHN | China | MYS | Malaysia |
| CIV | Cote d'Ivoire | NER | Niger |
| CMR | Cameroon | NGA | Nigeria |
| COD | Dem. Rep. of the Congo | NIC | Nicaragua |
| COL | Colombia | NLD | Netherlands |
| CPV | Cape Verde | NPL | Nepal |
| CRI | Costa Rica | NZL | New Zealand |
| CYP | Cyprus | OMN | Oman |
| CZE | Czech Republic | PAK | Pakistan |
| DEU | Germany | PAN | Panama |
| DJI | Djibouti | PER | Peru |
| DNK | Denmark | PHL | Philippines |
| DOM | Dominican Republic | PNG | Papua New Guinea |
| ECU | Ecuador | POL | Poland |
| EGY | Egypt | PRT | Portugal |
| ESP | Spain | PRY | Paraguay |
| EST | Estonia | QAT | Qatar |
| FIN | Finland | ROM | Romania |

Table A-3 Countries in database

| ISO3 | name | ISO3 | name |
|------|----------------|------|-----------------|
| FJI | Fiji | RUS | Russia |
| FRA | France | RWA | Rwanda |
| GAB | Gabon | SAU | Saudi Arabia |
| GBR | United Kingdom | SEN | Senegal |
| GHA | Ghana | SGP | Singapore |
| GIN | Guinea | SUR | Surinam |
| GMB | Gambia | SVK | Slovak Republic |
| GNB | Guinea Bissau | SVN | Slovenia |
| GRC | Greece | SWE | Sweden |
| GTM | Guatemala | TGO | Togo |
| HKG | Hong Kong | THA | Thailand |
| HND | Honduras | TUN | Tunisia |
| HRV | Croatia | TUR | Turkey |
| HTI | Haiti | TWN | Taiwan |
| HUN | Hungary | TZA | Tanzania |
| IDN | Indonesia | UGA | Uganda |
| IND | India | UKR | Ukraine |
| IRL | Ireland | URY | Uruguay |
| ISR | Israel | USA | United States |
| ITA | Italy | VEN | Venezuela |
| JAM | Jamaica | VNM | Vietnam |
| JOR | Jordan | ZAF | South Africa |
| JPN | Japan | ZMB | Zambia |
| | | ZWE | Zimbabwe |